# Generated Natural Data Area

Using the XML Toolkit, a Natural Data Area, or more precisely a Local Data Area, Parameter Data Area or Global Data Area, can be generated that represents a given Document Type Definition.

The generation follows following rules:

- Each Empty Element without Attributes (<!ELEMENT br EMPTY>) is generated as Natural variable of Type B1. This is necessary, because empty Natural groups are not allowed and.
- Each Empty Element with Attributes (<!ELEMENT br EMPTY><!ATTLIST br width CDATA #IMPLIED>) is generated as a Natural group.
- Each Element with content (<!ELEMENT b (#PCDATA)> )is generated as a Natural variable of type A253.
- Each Sequence of Elements (<!ELEMENT spec (front, body*, back?)>) or Choice of Elements (<!ELEMENT div1 (p | list | note)>) is generated as a Natural group.
- Each clasped Sequence or Choice (<!ELEMENT address ( (street, housenumber), (zip, city) )>) is generated as a special group with the name prefix "##PSEUDO". This gives the possibility to represent the context or possible multiplicities.
- Each Attribute (<!ATTLIST br width CDATA #IMPLIED>) of an Element is generated as variable of type A253 belonging to a group with the name prefix "ATTRIBUTES_OF_" followed by the name of the element.
- Multiple Elements are always generated as arrays of dimension 1:v. The upper bound of the generated array has to be changed manually.
- If an Element is defined multiple (<!ELEMENT spec (front, *body**)>), an additional counter filed C@BODY, is generated to specify the number of available elements.
- All names used inside the DTD are converted into upper case, because Natural names are not case sensitive. Duplicate names inside a generated group will be a extended with an postfix to make the names unique.
- Special Characters not valid for Natural names are converted into valid Natural names. For the conversion settings, see the option dialog of the XML Toolkit.

Restrictions:

- Elements with Mixed content data (<!ELEMENT p (#PCDATA | a | ul | b | i | em)*>) are not supported.
- DTDs that result in Natural data structures can not be used within Natural, because Natural only supports data structures with a maximum of three dimensions.

Example DTD:

```
<!ELEMENT EMPLOYEE  (FULL-NAME , FULL-ADDRESS , TELEPHONE ,JOB-TITLE, INCOME* )>
<!ATTLIST EMPLOYEE PERSONNEL-ID CDATA  #REQUIRED >

<!ELEMENT FULL-NAME  (FIRST-NAME , NAME )>
<!ELEMENT FIRST-NAME  (#PCDATA )>
<!ELEMENT NAME  (#PCDATA )>

<!ELEMENT FULL-ADDRESS  (ADDRESS-LINE* , CITY , ZIP , COUNTRY )>
<!ELEMENT ADDRESS-LINE  (#PCDATA )>
<!ELEMENT CITY  (#PCDATA )>
<!ELEMENT ZIP  (#PCDATA )>
<!ELEMENT COUNTRY  (#PCDATA )>

<!ELEMENT TELEPHONE  (PHONE , AREA-CODE )>
<!ELEMENT PHONE  (#PCDATA )>
```

 

```
<!ELEMENT AREA-CODE  (#PCDATA )>

<!ELEMENT JOB-TITLE (#PCDATA )>

<!ELEMENT INCOME  (SALARY , BONUS* )>
<!ELEMENT SALARY  (#PCDATA )>
<!ELEMENT BONUS  (#PCDATA )>
```

Generated Natural Data Area (*Italic* written parts of the DTD, but necessary for Natural):

```
DEFINE DATA PARAMETER
1 EMPLOYEE
  2 ATTRIBUTES_OF_EMPLOYEE
    3 PERSONNEL-ID(A253)
*
  2 FULL-NAME
    3 FIRST-NAME(A253)
    3 NAME(A253)
*
  2 FULL-ADDRESS
    3 C@ADDRESS-LINE(I4)
    3 ADDRESS-LINE(A253/1:v)
    3 CITY(A253)
    3 ZIP(A253)
    3 COUNTRY(A253)
*
  2 TELEPHONE
    3 AREA-CODE(A253)
    3 PHONE(A253)
*
  2 JOB-TITLE(A253)
*
  2 C@INCOME(I4)
  2 INCOME(1:v)
    3 SALARY(A253)
    3 C@BONUS(I4)
    3 BONUS(A253/1:v)
END-DEFINE
```